



# Small-group collaboration

## *How technology can facilitate small-group learning*

Educators are increasingly seeing the value of having students collaborate in small groups on classroom projects—and whether such projects involve producing a written or multimedia presentation, solving a math problem, or creating a video, technology can facilitate the group process.

With businesses seeking employees able to work in teams and collaborate on projects, more educators are looking for ways to incorporate these skills into the learning process.

“Everyone needs to be able to collaborate in a group, because that’s how things are done in the real world. No one sits alone and works by themselves any more,” said Stan Silverman, director of technology-based learning systems at the New York Institute of Technology.

Some educators believe students gain a deeper understanding when they participate in group projects.

Lance Sutton, a teacher at Westview Elementary School in Goose Creek, S.C., said: “When a teacher lectures to them, they forget; when you have kids help design something, they will remember for a lifetime.”

Sutton said collaboration is “a more positive way of teaching” and addresses the needs of students who learn best in different ways, such as those who are visual learners or auditory learners. He uses an interactive whiteboard and Interwrite Workspace software from eInstruction to facilitate small-group instruction with his fifth-graders.

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In one example of a recent collaborative exercise, he divided his class into three groups and asked each group to list the positive and negative aspects of the transcontinental railroad. Students were to talk about why they made certain choices and refine their ideas as a group.

Jason Williams, chair of the math department at Americus Sumter County High School in Americus, Ga., believes students “gain ownership of their learning” when they are asked to solve a problem collaboratively.

He often forms his students into groups and has them solve math problems—such as finding eight numbers with certain standard deviations—using the Interwrite Mobi tablets from eInstruction, which were designed specifically to support collaborative learning.

Technology-supported collaboration is used in class-

## Mini-projectors promote collaboration

“No one person can cover nearly as much information or get as many views and opinions as a group working together to develop a common understanding,” said Jim Hirsch, associate superintendent for academic and technology services in Plano, Texas.

Hirsch is interested in using mini-projectors, like those produced by BenQ, to promote collaborative learning and is planning to pilot them with eighth-graders at Robinson Middle School.

The idea is to have four or five students, already equipped with netbooks, collaborating on an assignment, with all of them able to view projected images—a web site, data from a spreadsheet, or other material—on a classroom wall without having to disrupt the rest of the class, Hirsch says.

Plano’s curriculum stresses multitasking in classrooms, which means some students might be working in groups, while others are working individually or listening to the

Silverman is designing a pilot project to test the impact of BenQ’s GPI mini-projectors on academic achievement, most likely for students in grades 5-8 in New York.

His plan is to “equip groups of three to five students with projectors in an environment where they are interacting with web-based resources and see if that makes a difference.”

The student groups could be formed in different ways, he says. For example, English learners and native speakers could be grouped together, as could weaker and stronger students, so the more advanced students could serve as mentors for their less-accomplished peers. Or, the more advanced students could be in the same group and be given a more difficult assignment. A teacher could mix up the class in different ways throughout the year, depending on the nature of the projects.

He suggests that each group have a student identified as a facilitator, recorder, and possibly, reflector, with those positions changing from project to project. After a group completes its work, the students can use the projector to share what they’ve learned with the whole class.

Silverman said the projectors could be connected to a laptop loaded with educational materials selected by the teacher. Good sources of content, he suggests, include SAS Curriculum Pathways and Verizon Foundation’s Thinkfinity web sites, which offer thousands of free lesson plans, interactive teaching tools, and reference materials, many of which are suited for small-group work.

For example, he said, Thinkfinity has a “persuasion map” activity developed by English teachers that a group of students can use to write a paper making a persuasive argument. It walks them through the steps of stating a goal or thesis, developing the supporting reasons and facts, and writing a document with input from the group.

## Livelier lessons

Diane Sheehan, an art teacher at Chenango Forks High School in Binghamton, N.Y., conducts collaborative projects whenever possible, telling students, “No matter what you do in the outside world, if you don’t get along with people, you won’t be successful.”

Sheehan recently acquired a BenQ GPI projector, which she plans to use for collaboration projects with her students.

She plans to have small groups of students in her video production class use the GPI to plan the theme for a video, create a storyboard, shoot footage, edit the final product, and then present their video to the rest of the class. She stores videos on an iPod to share with the class, and because the GPI connects directly to an iPod, she won’t need to convert her files to a DVD.

Another class project calls for four students to work together to design a robot and give a presentation selling the robot to their classmates. That kind of activity would be easier with the GPI, she said, because all the content can be loaded in advance on a thumb drive, and “when you only have 45 minutes for a class, you don’t want to waste time setting up equipment.”

She also expects the projector will be useful for teacher collaboration, noting that “collaboration is what teaching is all about.”

In her school, for example, an art teacher and math teacher worked together to present lessons on tessellation. “It’s really important for students to see everything is connected,” she said. In another recent collaborative effort, Sheehan reinforced the history curriculum by having her students draw pictures, write screenplays, or perform skits to illustrate the historic events in the lyrics of the Billy Joel song, “We Didn’t Start the Fire.”

## Collaboration and 21st-century skills

Collaborative projects not only help teach content, but also can help students develop 21st-century skills such as communication, time management, teamwork, and facilitation, Silverman said. With this approach, “the teacher is seen less like an evaluator and more as a coach, facilitator, and mentor. Teachers today need to know how to mix and



Working on projects in small groups of three to five students helps foster key 21st-century skills.

rooms throughout the Jefferson County, Colo., school district, which has adopted the national technology standards issued by the International Society for Technology in Education, says John Canuel, executive director of educational technology services. The standards call for students to “use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.”

In elementary schools, Canuel notes, a group of three to five students might work on a SMART Board, which the teacher has loaded with a certain activity, such as a math exercise involving making change using coins and dollar bills in the form of “large virtual manipulatives.” At the same time, the other students in the class might be working on laptops or with pencil and paper or meeting with the teacher.

Groups of older students often collaborate on a wiki, journal, or blog using laptops connected to the same document through Google Apps, he says. The district has its own domain, so the students are only able to access protected material. In high schools, groups of four or five students might collaborate on an assignment and share resources using the Blackboard learning-management system.

To help teachers become more comfortable with collaborative learning, all teacher professional development in Jefferson County takes place online, and teachers take part in online collaborative work groups.

teacher. “To get the most personalized learning,” Hirsch said, “everyone shouldn’t be working on the same thing at the same time.” He believes mini-projectors could be a “key component of multitasking in the classroom.”

Silverman, of the New York Institute of Technology, says ultraportable projectors “have the potential of making a real impact” on teaching 21st-century skills, particularly collaboration.

In a traditional classroom arrangement—with the teacher lecturing at the front of the class—“the group becomes homogenized,” Silverman says. The teacher targets the instruction to the middle, ignoring the passive, inattentive students in the back and the more advanced students who might be bored because they already know the material.

The teacher might ask two to four students to come to the front of the room to solve a problem, but the rest are “educational voyeurs,” he says.

But when groups of students collaborate together on a project simultaneously, in different parts of the room, “the level of interactivity goes up exponentially,” Silverman says. “It’s harder for a student to be silent; there is more pressure to participate.”

Students can still work collaboratively in groups with a pencil and paper, but “students have electronic expectations now,” Silverman says. Working on paper, they would have to pass their work around. But when their work is displayed on a projector and the whole group can see it easily, he says, “they are truly working as a group.”

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match those different roles to maximize learning.”

Communication and collaboration are among the key skills necessary for succeeding in school and life, as identified by the Partnership for 21st Century Skills, along with such skills as critical thinking, creativity, problem solving, flexibility, and media literacy.

The partnership defines collaboration as the ability to work effectively and respectfully with diverse teams, the willingness to compromise to accomplish a common goal, and the ability to share responsibility for collaborative work and to value the individual contributions made by each team member.

A white paper published by the Partnership cites research by David Johnson and Roger Johnson that found “students who work together cooperatively show dramatic increases in academic achievement, self-esteem, and positive social skills.”

The Teaching Effectiveness Program at the University of Oregon’s Teaching and Learning Center summarized several additional benefits of collaborative learning from various studies:

- Effective groups assume ownership of a process and

its results when individuals are encouraged to work together toward a common goal.

- Students’ critical thinking skills improve, along with their retention of information and interest in the subject matter.
- Collaborative learning allows the assignment of more challenging tasks without making the workload unreasonable.
- It provides weaker students with extensive one-on-one tutoring, while stronger students gain the deeper understanding that comes only from teaching others.
- Students are less likely to consider teachers the sole sources of knowledge and understanding.

### Global collaboration

It’s essential “to know how to collaborate across a digital learning environment,” as well as face to face, said Canuel of Jefferson County, who noted that one of the most important things businesses want to know about job applicants is “how effectively you work in a collaborative environment.”

He recalled how the dean of a university engineering department told a recent gathering of students and parents that, “To be an effective engineer, you have to work collaboratively with engineers in different countries, different time zones, and probably different cultures. That

was quite a shock to some of our parents who thought it was enough to be a good student.”

In Forsyth County, Ga., a growing number of schools are using desktop videoconferencing to collaborate globally, reports Jill Hobson, director of instructional technology. In one current-events class, for example, students exchange information about the political situation, schools, and other issues with students in Greece, Russia, and China.

Elementary students are learning about insects through a collaborative project with scientists at the University of Chicago, she said. The students send samples of insects to the university, which they can then view on the university’s electronic microscope. The images are accessible via computer and projected so the whole class can see them.

At one point, a group of third-graders asked about a particular part on a ladybug, and the scientists admitted they didn’t know what it was and promised to research it for the students. That illustrated how science really works, Hobson said, adding: “It was a phenomenal experience for those kids.”

Collaboration is “authentic learning,” Hobson said, and it is “transformational in that kids see their work is valued beyond the teacher. We’re so very connected now, it’s critical that kids have the ability to collaborate even when they’re not in the same physical space.” **eSN**

## BenQ’s GP1 projector is portable, lightweight, and convenient for small-group collaboration

Ultraportable projectors, such as BenQ’s GP1, are ideally suited to small-group collaboration, as well as structured presentations delivered by a teacher, users say.

The GP1 can be loaded with educational content in a variety of forms—photos, graphics, video, PowerPoint presentations, documents, lesson plans, and reference material—using a USB flash drive, eliminating the need for hooking it up to a PC or converting content to a DVD.

The GP1 displays an image that is only about 30 inches by 40 inches in size, making it ideal for viewing by a small group of students in a corner of the classroom, says Juan Alvarez, director of U.S. education for the BenQ Corp., which is based in Taiwan. And because it can project a relatively small image up close, several groups of students can work with GP1s in separate corners of a classroom easily.

After the students complete their work, he says, they could use the projector to share what they’ve learned with the rest of the class.

Because the device is easy to set up, “you can maximize the time for learning,” Alvarez says.

In schools that have yet to focus on small-group collaboration, teachers are finding that BenQ mini-projectors can enliven classroom lessons by allowing them to turn a traditional lecture into an interactive, multimedia experience.

The Baltimore County, Md., school system uses BenQ GP1 projectors in the immersive environment of the district’s two inflatable, portable Starlab planetariums, which the district uses to teach astronomy lessons aligned with Maryland’s science standards for students in preschool through grade 5, says David Copenhagen, elementary coordinator in the Office of Science PreK-12.

The Starlabs rotate among the district’s 106 elementary schools, spending about eight days a year in each school’s gym. Various classes are brought inside to experience being in space as images of stars and planets are projected on the ceiling and walls. As many as 30 students can fit in the Starlab, once they crawl through a small opening to get inside.

The district used to use slide projectors, but when “they started breaking down, and we couldn’t find parts,” the district switched to BenQ GP1 mini projectors, says Starlab resource teacher Tim Kent. “We didn’t want to take a laptop inside the Starlab, because it has a bright screen, and we wanted total darkness,” she explains. Also, the BenQ only needs one plug, which avoids a lot of messy cables in a small, crowded space.

The projectors are loaded with hundreds of slides from NASA, including images taken by the Hubble telescope, and movie clips, such as Neil Armstrong’s walk on the moon. The slides were scanned into computers and converted into a digital format and copied to flash drives, which plug into the projector.

Kent’s lessons include lots of interaction, with students taking notes on clipboards with pens that light up. He might have kids draw constellations and compare them to what the ancient Greeks saw in the night sky. Or, they might try to figure out what an alien life form might look like, based on a particular planet’s characteristics.

“We try to get them to role play as much as possible. With the pre-K students, we pretend like we’re floating in space,” he says.

“We live in a visual society,” Kent adds, and watching images projected inside the Starlab “is like watching them on a big movie screen. It makes the galaxy come alive.”

The GP1 uses LED technology for the lamp, which lasts 20,000 hours, compared with 3,000 to 4,000 hours for a traditional projector lamp, Alvarez says. Lamps cost \$300 to \$400 to replace. A typical classroom uses a projector for 1,000 hours a year, and most non-LED projectors will need at least one lamp replacement every three to four years, which adds considerably to the cost.

And unlike the traditional lamp, which decays over time and loses about 50 percent of its power by the end of its life, “the LED lamp doesn’t lose any brightness,” Alvarez says.

That’s particularly important to Bill Tudor, director of exhibitions and technology at the Center for



Art, Design, and Visual Culture at the University of Maryland’s Baltimore campus, who uses GP1 projectors to create an immersive environment for viewing artworks, including one piece that requires four projectors displaying images on four walls.

“The color balance starts to shift when bulbs start wearing out, and you spent a lot of time correcting and calibrating” the image, he says.

The brightness of the GP1 lamp is about 100 lumens, compared with 2,500 lumens in a traditional projector, but “LED [technology] makes it feel brighter,” Alvarez says.

Other features of the GP1 include wall color correction, SVGA resolution of 858 x 600 pixels, low power consumption, DLP filter-free operation, and a 16.7 million color palette. The device weighs just 1.4 pounds. The GP1 can play audio either through the 2-watt speakers included in the unit or through headphones. It also comes with cables that can be attached to a laptop, digital camera, iPod, cell phone, gaming console, DVD player, or TV.

BenQ is offering the GP1 for educators with a three-year warranty through Dec. 31 for \$499. To request a free loaner, contact BenQ at Education.US@BenQ.com. **eSN**



# BenQ

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